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(71) Applicants
George James,
3 Main Road,
Holbrook,
Nr Ipswich,
Suffolk.
(72) Inventors
George James
(74) Agents
Wynne-Jones, Laine and James,
33 St. Mary Street,
Cardiff,
Glamorgan,
CF1 2AB

(54) **Improvements relating to fuel burners**

(57) A pin 23 is provided for clearing a jet nozzle 12 of a fuel burner leading from a chamber 13 into which fuel is introduced through a fuel supply duct 10. When it is desired to clear the nozzle 12, pressure is applied from the pressurised fuel supply via a valve 22 to a piston 18, thus creating a differential pressure on the compound piston 18 and 17 to drive the pin 23 into the nozzle 12. In a modification movement of the pin can be provided by a manually-actuated plunger. Figure 2 (not shown).

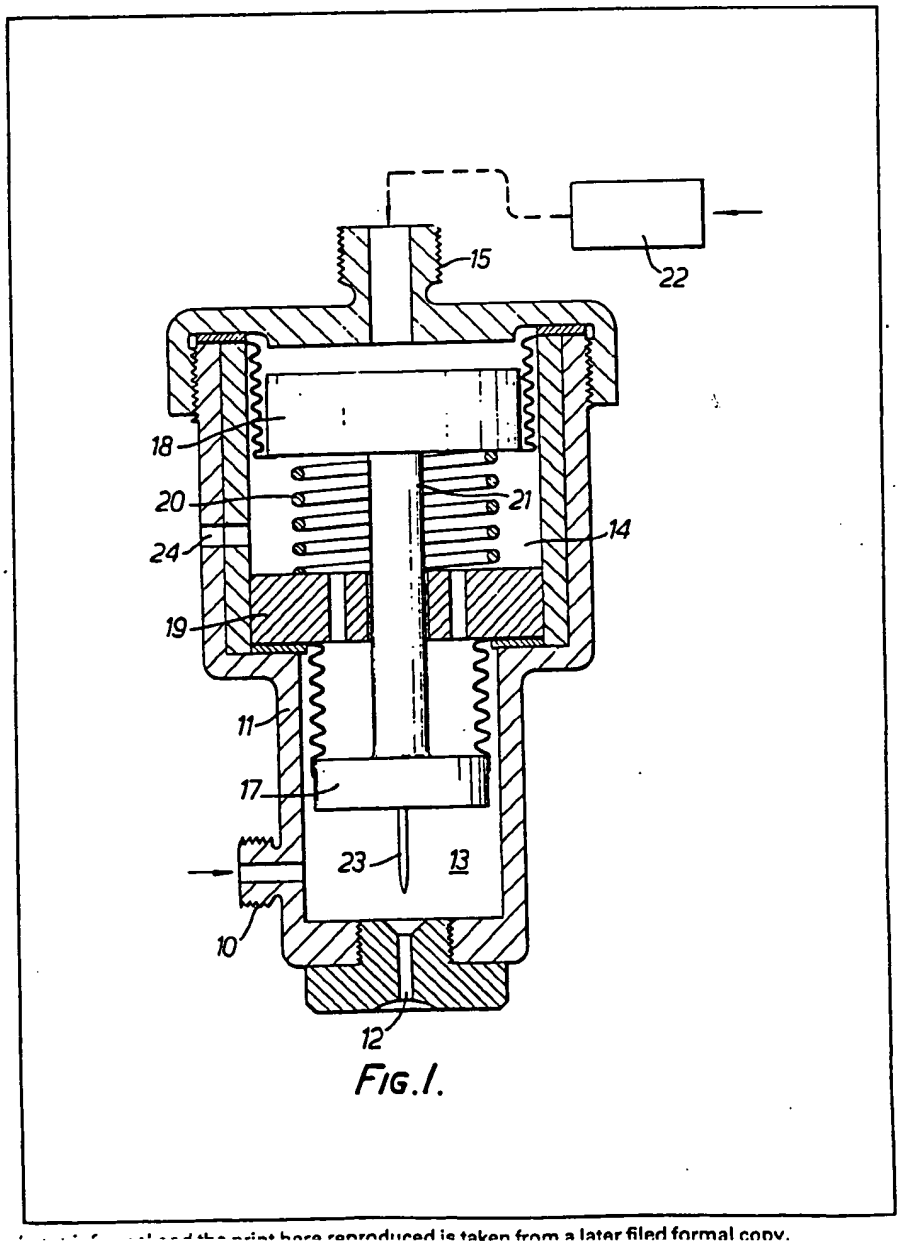

FIG. 1.

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SPECIFICATION

Improvements relating to fuel burners

This invention relates to a device for clearing the nozzle of a fuel burner. The invention is particularly though not exclusively applicable to fuel burners of the type designed to burn vapourised liquid fuel, the liquid being vapourised by heat derived from the combustion of the fuel.

Various attempts have been made to provide means for clearing the nozzle of a fuel burner. The nozzle is usually of small dimensions and to clear the nozzle by means of a hand tool applied externally is notoriously difficult. It has also been proposed to include a clearing-pin mounted within the fuel supply duct to the nozzle, the pin being movable into the nozzle aperture from its inner end. Existing clearing mechanisms of this type suffer from various disadvantages including the difficulty of providing a satisfactory seal for the operating mechanism. These difficulties are increased if the burner is directed downwardly so that the whole assembly is subject to considerable heat.

It is an object of the invention to provide an improved device for clearing a fuel burner nozzle.

According to the invention there is provided a fuel burner comprising a fuel supply duct or chamber for conducting vapourised fuel under pressure to a nozzle, and means for clearing the nozzle of obstruction, including a pin movable in or into the nozzle orifice and connected to a pressure-operated actuator preferably arranged to be subject to the pressure of the fuel in the supply duct.

Preferably the actuator comprises a piston and cylinder assembly, or a diaphragm or bellows, and the actuator may be controlled by a valve. The valve may be of a seal-less type. In one preferred construction the actuator is permanently subject on one side to the fuel pressure and/or spring pressure, and on the other side is subject to the pressure controlled by the valve. For example the actuator may comprise a differential piston including two opposed piston surfaces of different effective areas. Alternatively or in addition the actuator piston, or diaphragm, may be opposed by a spring.

The invention is particularly applicable to a fuel burner as defined in combination with a fuel tank and means for pressurising the tank, for example an air pump. Thus the invention may be of particular utility in fuel burners forming part of heated tools designed for use in laying or smoothing asphalt or the like. The tool may include a bottom plate or shoe to be applied to the asphalt, with the burner positioned above the plate so that the burner flame is directed downwards onto the plate, and the nozzle clearing mechanism is then mounted vertically above the nozzle aperture.

The invention may be performed in various ways and preferred embodiments thereof will now be described with reference to the accompanying drawings, in which:-

Figure 1 is a diagrammatic sectional side elevation through a vaporising fuel burner of this invention;

Figure 2 is a vertical cross-section through a heated tool incorporating a fuel burner of this invention; and

Figure 3 is a cross-section on line III-III of Figure 2.

In the example shown in Figure 1, the invention is to be applied to a fuel burner forming part of an asphalt smoothing tool, the burner being designed to operate on vapourised paraffin obtained from a tank which is provided with a small hand-pump for pressurising the tank. Liquid paraffin under pressure is delivered from this tank through a flexible pressure duct and a lateral inlet port 10 into the lower part of a closed casing 11 having a central lower nozzle aperture 12. Means are provided (not shown) for conducting or otherwise conveying heat from the burner flame to this casing 11, or apart of the fuel supply conduit upstream of the casing, in order to vapourise the liquid paraffin. The vapourised paraffin issuing through the nozzle aperture 12 is ignited and the flame is projected vertically downwards onto the shoe of the tool.

The chamber 13 above the nozzle aperture 12 communicates with a further chamber 14 of larger transverse dimensions immediately above, the upper end of the second chamber being closed apart from a pressure inlet 15 which is connected either to the same liquid fuel supply line leading to the inlet port 10 of preferably to the upper end of the fuel tank, to be subject to the air pressure in the tank. Each of the two chambers 13, 14 contains a sliding piston 17, 18, the upper portion 18 being of slightly larger diameter than the lower piston 17. A spring 20 surrounding a stem 21 interconnecting the two pistons is arranged to act upwardly, the lower end of the spring seating on an abutment ring 19 at the lower end of the upper chamber 14. A valve indicated diagrammatically at 22 is provided for controlling the pressure of fluid admitted to the upper end of the upper chamber 14. This valve may be of a conventional two-way plug cock type, or it may be a seal-less valve or a valve with a positive bellows type seal, i.e. a permanently totally enclosed valve which cannot leak to atmosphere, comprising for example a flexible tube with a pinch clip.

In operation, when the burner is fully pressurised and in use, the valve 22 is closed and the pressure of fuel in the lower chamber 13 holds the double piston assembly 17, 18, 21 in its upper position. A pin or pricker 23 attached to the lower end of the lower piston 17 is thus in a positioned raised clear of the nozzle orifice 12. When it is required to clear an obstruction in the nozzle orifice the valve 22 is opened thus admitting pressurised fluid to the upper end of the upper chamber 14, and since the upper piston 18 is of larger effective diameter the double piston assembly will be driven downwards moving the pricker 23 onto the nozzle orifice. The space between the two pistons is vented to atmosphere via an aperture 24 in the casing, and the two pistons 17, 18, are each provided with permanent positive flexible bellows seals to prevent leakage. The valve may be opened and closed a number of times to reciprocate the pricker and when the orifice is clear the valve will again be closed.

In a possible modification the two pistons may be combined in one, which may be a compound

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It is an object of the invention to provide an improved device for clearing a fuel burner nozzle.

According to the invention there is provided a fuel burner comprising a fuel supply duct or chamber for conducting vapourised fuel under pressure to a nozzle, and means for clearing the nozzle of obstruction, including a pin movable in or into the nozzle orifice and connected to a pressure-operated actuator preferably arranged to be subject to the pressure of the fuel in the supply duct.

Preferably the actuator comprises a piston and cylinder assembly, or a diaphragm or bellows, and the actuator may be controlled by a valve. The valve may be of a seal-less type. In one preferred construction the actuator is permanently subject on one side to the fuel pressure and/or spring pressure, and on the other side is subject to the pressure controlled by the valve. For example the actuator may comprise a differential piston including two opposed piston surfaces of different effective areas. Alternatively or in addition the actuator piston, or diaphragm, may be opposed by a spring.

The invention is particularly applicable to a fuel burner as defined in combination with a fuel tank and means for pressurising the tank, for example an air pump. Thus the invention may be of particular utility in fuel burners forming part of heated tools designed for use in laying or smoothing asphalt or the like. The tool may include a bottom plate or shoe to be applied to the asphalt, with the burner positioned above the plate so that the burner flame is directed downwards onto the plate, and the nozzle clearing mechanism is then mounted vertically above the nozzle aperture.

The invention may be performed in various ways and preferred embodiments thereof will now be described with reference to the accompanying drawings, in which:-

Figure 1 is a diagrammatic sectional side elevation [illegible] comprising fuel burner of this invention;

heated tool incorporating a fuel burner of this invention; and

Figure 3 is a cross-section on line III-III of Figure 2.

In the example shown in Figure 1, the invention is to be applied to a fuel burner forming part of an asphalt smoothing tool, the burner being designed to operate on vapourised paraffin obtained from a tank which is provided with a small hand-pump for pressurising the tank. Liquid paraffin under pressure is delivered from this tank through a flexible pressure duct and a lateral inlet port 10 into the lower part of a closed casing 11 having a central lower nozzle aperture 12. Means are provided (not shown) for conducting or otherwise conveying heat from the burner flame to this casing 11, or apart of the fuel supply conduit upstream of the casing, in order to vapourise the liquid paraffin. The vapourised paraffin issuing through the nozzle aperture 12 is ignited and the flame is projected vertically downwards onto the shoe of the tool.

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In a possible modification the two pistons may be [illegible] which may be a compound

differential piston. Alternatively, the piston may be replaced by one or more diaphragm, or wrap-over seals, providing positive sealing without any possibility of leakage. Instead of applying the control pressure to the upper end of the piston or diaphragm unit, the device may include a spring at this remote end with the valve arranged to control the admission of pressure fluid to the other end of the chamber adjacent to the pricker and nozzle.

It will be noted that in the example illustrated in Figure 1, the burner and pricker unit has no sliding or rubbing parts exposed to the fuel or fuel vapour, the two pistons being guided by the stem 21 and the seals being in the form of flexible bellows formed preferably of a resilient metal or a temperature and fuel resistant synthetic plastics material. This design reduces the possibility of failure in use.

In the device shown in Figures 2 and 3 the vapourised paraffin is delivered through a duct 25 leading to a housing 26 which supports a piston assembly 27 above and a heating chamber 28 below. The fuel is caused to pass from a passageway 29 within the housing 26 into a tube 30 which projects into the heating cbhamber 28. At its lower end the tube 30 is connected to a part 31 defining an annular chamber 32 which communicates with a further tube 33 leading back to a further passageway 29 in the housing 26. This passageway 29 communicates via an annular opening 35 with a chamber 36 within which is housed a pricker 37 immediately above a nozzle aperture 38 communicating with the heated chamber 28. The pricker 23 is mounted on a compound piston member 39 to whose other end is secured a plunger 40. The piston 39 can be moved up and down within the limits defined by the pins 41 sliding in slots 42 in the side walls of the outer sleeve 43 of the piston assembly 27. These slots 42 also allow for a pressure equalisation of the interior of the sleeve 43 to the atmosphere and a flexible bellows sleeve 44 prevents possible leakage of fuel from the chamber 36. To the lower end of the heated chamber 28 there is secured a shoe 45 of an asphalt smoothing tool.

The plunger 40 can be caused to be operated either by hand or in a manner comparable to the way in which the piston 18 of Figure 1 is actuated by means of pressure from the fuel supply tank via the valve 22. Also the plunger 40 can be rotated to screw down on the piston assembly 39 to cause a reduction in the size of the annular opening 35, or of the gap between the pricker 37 and the nozzle 38 to reduce the rate of flow of fuel to the burner.

CLAIMS

1. A fuel burner comprising a fuel supply duct or chamber for conducting vapourised fuel under pressure to a nozzle, and means for clearing the nozzle of obstructions including a pin movable in or adjacent to the nozzle orifice and connected to a pressure-operated actuator.

2. A fuel burner according to claim 1, wherein the actuator is arranged to be subject to the pressure of fuel in the fuel supply duct or chamber.

3. A fuel burner according to claim 1 or claim 2, in which the actuator comprises a piston and cylinder assembly, and/or a diaphragm or bellows.

4. A fuel burner according to any one of claims 1 to 3, in which the actuator is controlled by a valve.

5. A fuel burner according to claim 4, in which the actuator is permanently subject on one side to the fuel pressure and/or spring pressure and on the other side is subject to the pressure controlled by the valve.

6. A fuel burner according to claim 4 or claim 5, in which the actuator comprises a differential piston assembly or a diaphragm assembly.

7. A fuel burner according to any one of claims 4 to 6, in which the valve is of a seal-less type.

8. A fuel burner according to any one of claims 1 to 7, in combination with a fuel tank and means for pressurising the tank.

9. A heated tool comprising a fuel burner according to any one of claims 1 to 8 and a bottom plate or shoe, with the burner positioned above and joined by a connector portion to the plate so that the flame will be directed down onto the plate, and with the nozzle clearing mechanism mounted vertically above the nozzle aperture.

10. A heated tool according to claim 9, including members defining a passageway from the fuel tank through the heated connector portion and thence to a region upstream of the nozzle orifice.

11. A fuel burner or a heated tool substantially as herein described with reference to the accompanying drawings.

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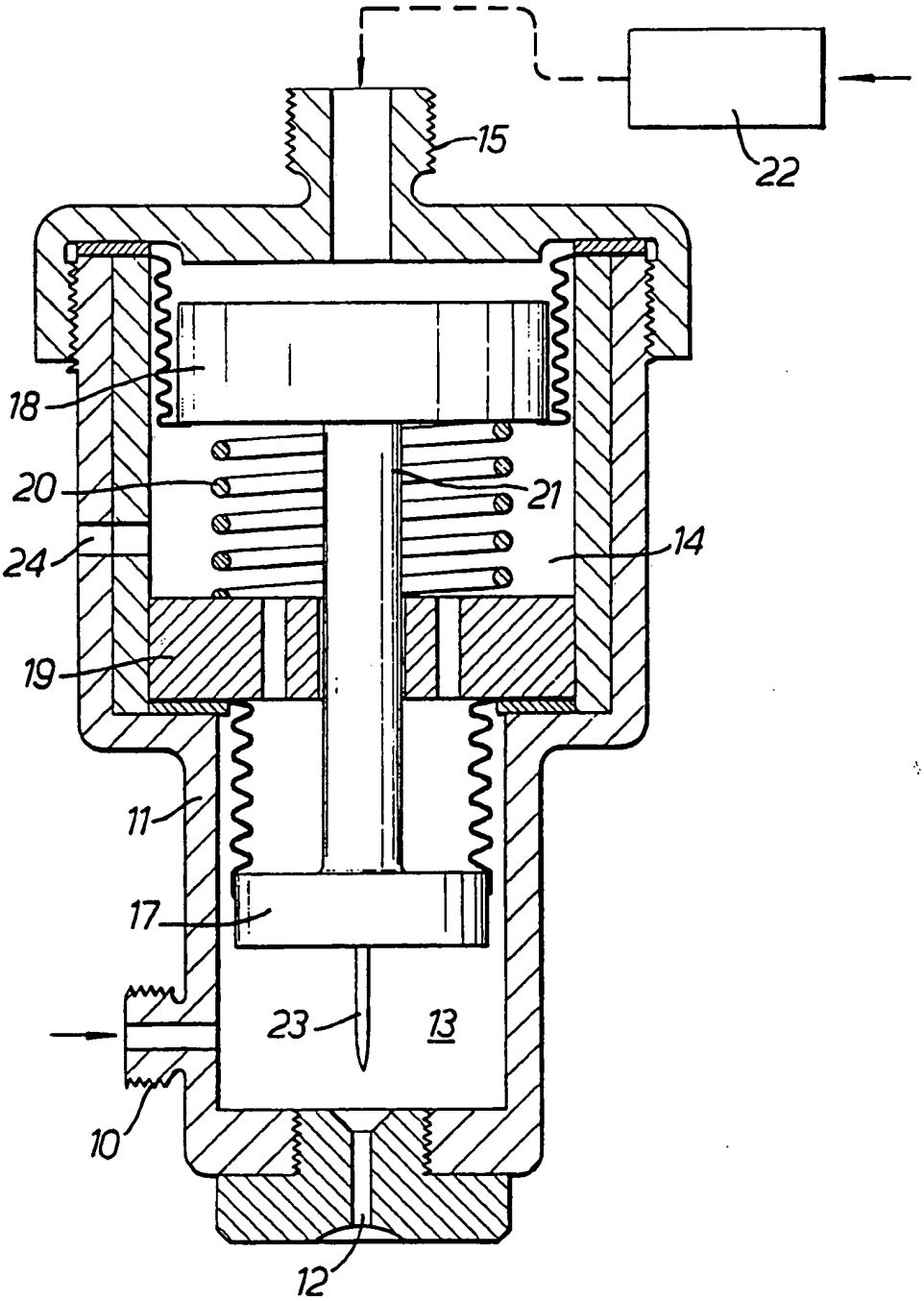

FIG. 1.

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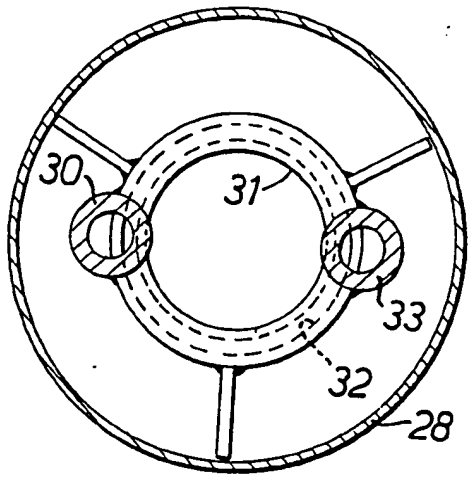

FIG. 3.

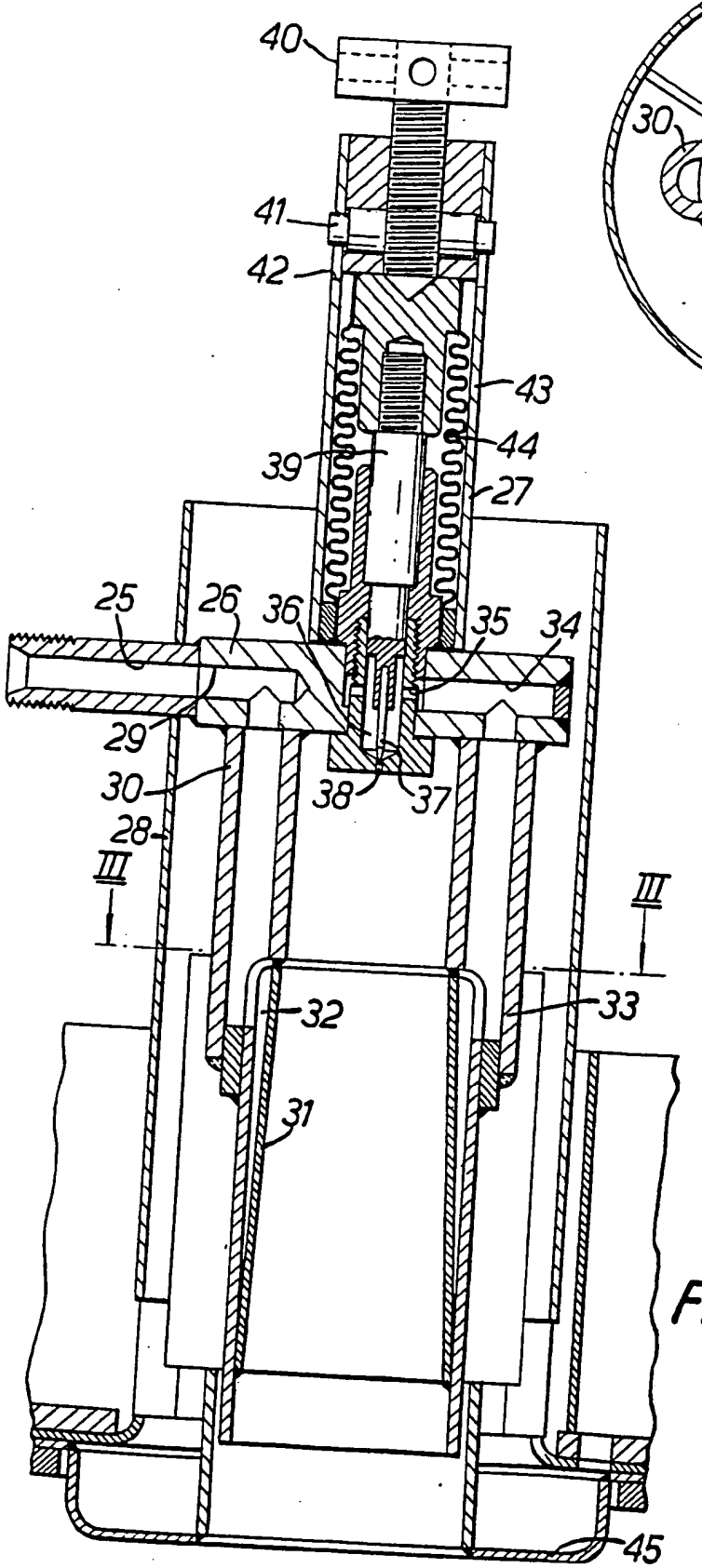

FIG. 2.